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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/761,594	01/16/2001	Hans-Jurgen Hacke	GR 98 P 4137 P	5815

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EXAMINER

HARAN, JOHN T

ART UNIT	PAPER NUMBER
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1733

DATE MAILED: 09/11/2002

12

Please find below and/or attached an Office communication concerning this application or proceeding.

mk-12

Office Action Summary

Application No.

09/761,594

Applicant(s)

HACKE ET AL.

Examiner

John T. Haran

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 July 2002 and 06 August 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5 and 11-24 is/are pending in the application.
- 4a) Of the above claim(s) 11, 12 and 18 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5 and 13-17 and 19-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

1. This Office Action is in response to the amendments filed on 7/24/02 and 8/6/02.

Election/Restrictions

2. This application contains claims 11, 12, and 18 drawn to an invention nonelected in Paper No. 7. A complete reply to the final rejection must include cancellation of nonelected claims or other appropriate action (37 CFR 1.144) See MPEP § 821.01.

Applicant indicates that "it is believed not to be patentably distinct (for the present invention) whether the conductive material is a solder paste or a conductive adhesive" on page 8 of the response filed on 7/24/02 (Paper No. 10) and urges that all pending claims should be examined. However, when traversing a species election, such as the one between using solder paste or conductive adhesive as the conductive material, applicant should traverse on the ground that the species are not patentably distinct and applicant should **submit evidence or identify such evidence now of record showing the species to be obvious variants or clearly admit on the record that this is the case**. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention. Applicant has not submitted such evidence and therefore the restriction is maintained.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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4. Claims 1-5 and 13-17 and 19-24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The phrase "the thickness of said second insulating layer, said elasticity of said conductive material, and said elasticity of said small balls resulting in a desired comparatively good mechanical decoupling from a printed circuit board upon the semiconductor being soldered onto the printed circuit board" renders claims 1 and 3 indefinite.

First, it is entirely unclear what is meant by the word "comparatively".

Comparative to what?

Secondly, the term "good" is a relative term which renders the claim indefinite. The term "good" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

Third, there is a lack of antecedent basis for "the printed circuit board".

Furthermore in regards to claim 1, it is unclear how this phrase further limits the semiconductor device.

Also in regards to claim 3, it is unclear how the phrase further limits the method of making a semiconductor device because making a semiconductor device would not include steps of soldering a semiconductor device to a printed circuit board or mechanically decoupling it.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1-5 and 13-17 and 19-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akagawa et al (EP 734,059) in view of Farnworth et al (U.S. Patent 6,639,600) and IBM Technical Bulletin, "Solder Plated Resin Ball" pages 463-464.

Akagawa et al are directed to a chip sized semiconductor device and a process for making it comprising providing chips (32), placing electrical connection pads on the chip (36), applying a first insulating layer (38) such that the electrical connection pads are left partially uncovered, producing interconnects (40) on the first insulating film leading from the electrical connection pads (36) to a base region (43) of external connection elements; applying a second insulating layer (42) on the interconnects and the first insulating layer that is thicker than the first insulating layer; forming openings (44) in the second insulation layer above the base regions; and placing solder balls (46) in the openings and attaching them to the base regions. Akagawa et al are silent towards the balls being plastic balls having a metallic coating.

It is well known and conventional in the semiconductor art to use plastic balls having a metallic coating and an outer solder coating in place of pure solder balls because the plastic is more reliable to withstand thermal stress, as shown for example

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in IBM Technical Bulletin, "Solder Plated Resin Ball" page 463. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the resin ball of the IBM Technical Bulletin in the method and product of Akagawa et al in order to increase resistance to thermal stress.

Akagawa et al are also silent towards bonding the balls to the base region by placing a conductive material in the opening and attaching the ball to the connection pads via the conductive material. Akagawa et al teach bonding the solder ball to the base region through a reflow process (Column 9, line 3). It is well known and conventional to use conductive material, such as conductive adhesive, to attach balls to a surface in place of a reflow process, as shown for example in Farnworth et al (Column 11, lines 61-64). The two are alternative expedients and it would have been obvious to use either and only the expected results would be achieved. It would have been obvious to one of ordinary skill in the art at the time the invention was made to place conductive material in the opening and attach a resin ball coated with metal to the base region via the conductive material in the method and product of the Akagawa et al.

It is also noted that one skilled in the art would have readily appreciated that the product derived from the method of Akagawa et al, as modified above would be capable of being soldered to a printed circuit board and of being mechanically decoupled from the printed circuit board.

Regarding claims 2, 17, and 23-24, one skilled in the art would have readily appreciated that the thickness of the second insulation layer is within the purview of one

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skilled in the art. It would have been obvious to have the second insulation layer be four times thicker than the first insulation layer if so desired.

Regarding claim 4, it is well known and conventional to using a doctor blade for introducing conductive adhesive into openings. It would have been obvious to use conventional means for introducing the adhesive into the openings in the method of Akagawa et al, as modified above.

Regarding claim 5, Akagawa et al teach forming the chips on a wafer and dicing the wafer after the assembly process is complete (Column 9, lines 48-57).

Regarding claims 13 and 19, Farnworth et al teach using conductive adhesive and curing it.

Regarding claims 14-15 and 20-21, completely metal balls and metallized plastic balls are both well known and conventional and it would have been obvious to use either.

Regarding claims 16 and 22, one skilled in the art would have readily appreciated that the opening in the second insulation layer of Akagawa et al is circular in shape to accommodate the ball and that adhesive placed in the opening would assume a cylindrical shape. It would have been obvious to one of ordinary skill in the art at the time the invention was made to place conductive adhesive in the opening and thereby assume a cylindrical shape in the method and product of the Akagawa et al.

Response to Arguments

7. Applicant's arguments filed 7/24/02 have been fully considered but they are not persuasive.

As noted above the phrase "the thickness of said second insulating layer, said elasticity of said conductive material, and said elasticity of said small balls resulting in a desired comparatively good mechanical decoupling from a printed circuit board upon the semiconductor being soldered onto the printed circuit board" renders the claims indefinite.

In any event one skilled in the art would have readily appreciated that the product derived from the method of Akagawa et al, as modified above would be capable of being soldered to a printed circuit board and of being mechanically decoupled from the printed circuit board.

Conclusion

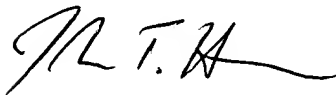
8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **John T. Haran** whose telephone number is **(703) 305-0052**. The examiner can normally be reached on M-Th (8 - 5) and alternate Fridays.

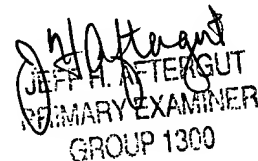
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael W. Ball can be reached on (703) 308-2058. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.



John T. Haran

September 9, 2002



JEFF H. AFTERGUT
PRIMARY EXAMINER
GROUP 1300